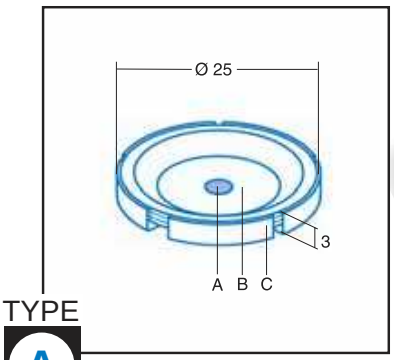
## • Sources for calibration of beta detectors

Designed for efficiency calibration of β detectors and counting systems, beta point sources are characterized in terms of the emerging flux of β particles, expressed in $s^{-1}$, within a solid angle **of 4 π sr.**

## • Technique

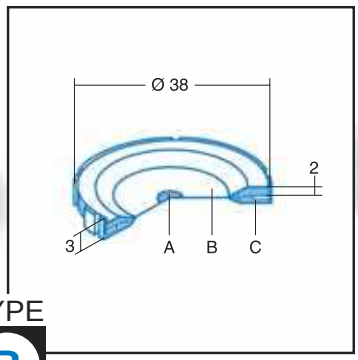
The sources are hot-sealed between two thin plastic foils and gold-coated. They are then mounted in a removable metal ring to ensure rigidity and ease of handling.
They can be used with or without the ring holder for calibration of all β detectors, including windowless 2 π or 4 π counters.

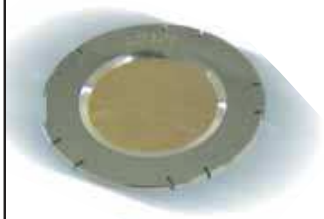
## • Available source holders




TYPE **A**

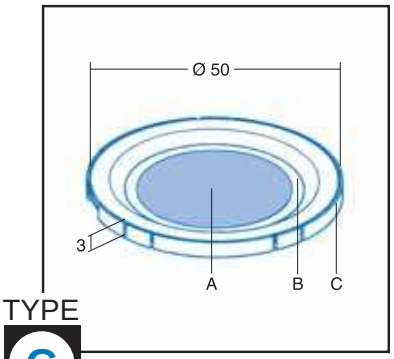
***A:*** *active area, diameter 3 mm*
***B:*** *diameter 15 mm*
***C:*** *metal ring, thickness 3 mm*



TYPE **B**

***A:*** *active area, diameter 3 mm*
***B:*** *diameter 22 mm*
***C:*** *metal ring, thickness 3 mm*




TYPE **C**

***A:*** *active area, diameter 30 mm*
***B:*** *diameter 35 mm*
***C:*** *metal ring, thickness 3 mm*

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## • Made-to-measure sources upon request

**Activity on request**

*Radionuclide* — *Type of holder (holder A)*

**C14EBSA[1KBQ]**

*Type of product (Beta standard)* — *Required activity (kBq)*

# Sources for calibration of beta detectors

| Radionuclide<br>*Half-life* | Radiation energy (MeV) β max | Product code | β particle flux within 4 π sr<br>$s^{-1}$(*) | Equivalent activity<br>Bq(*) | Holder Diameter<br>mm | Type | Measurement uncertainty<br>% |
|---|---|---|---|---|---|---|---|
| $^{14}C$<br>*5,73 x $10^3$ years* | 0,156 | C14EBSA20 | 8 x $10^1$ | 8 x $10^1$ | 25 | A | 1 |
| | | C14EBSA30 | 3 x $10^3$ | 3 x $10^3$ | 25 | A | 0,7 |
| | | C14EBSB20 | 8 x $10^1$ | 8 x $10^1$ | 38 | B | 1 |
| | | C14EBSB30 | 3 x $10^3$ | 3 x $10^3$ | 38 | B | 0,7 |
| | | C14EBSC20 | 8 x $10^1$ | 8 x $10^1$ | 50 | C | 1 |
| | | C14EBSC30 | 3 x $10^3$ | 3 x $10^3$ | 50 | C | 0,7 |
| $^{36}Cl$<br>*3,01 x $10^5$ years* | 0,709 | CL36EBSA20 | 8 x $10^1$ | 8 x $10^1$ | 25 | A | 1 |
| | | CL36EBSA30 | 3 x $10^3$ | 3 x $10^3$ | 25 | A | 0,7 |
| | | CL36EBSB20 | 8 x $10^1$ | 8 x $10^1$ | 38 | B | 1 |
| | | CL36EBSB30 | 3 x $10^3$ | 3 x $10^3$ | 38 | B | 0,7 |
| | | CL36EBSC20 | 8 x $10^1$ | 8 x $10^1$ | 50 | C | 1 |
| | | CL36EBSC30 | 3 x $10^3$ | 3 x $10^3$ | 50 | C | 0,7 |
| $^{60}Co$<br>*1,93 x $10^3$ days* | 0,318 | CO60EBSA20 | 8 x $10^1$ | 8 x $10^1$ | 25 | A | 1 |
| | | CO60EBSA30 | 3 x $10^3$ | 3 x $10^3$ | 25 | A | 0,7 |
| | | CO60EBSB20 | 8 x $10^1$ | 8 x $10^1$ | 38 | B | 1 |
| | | CO60EBSB30 | 3 x $10^3$ | 3 x $10^3$ | 38 | B | 0,7 |
| | | CO60EBSC20 | 8 x $10^1$ | 8 x $10^1$ | 50 | C | 1 |
| | | CO60EBSC30 | 3 x $10^3$ | 3 x $10^3$ | 50 | C | 0,7 |
| $^{134}Cs$<br>*7,55 x $10^2$ days* | 0,089<br>0,415<br>0,658 | CS134EBSA20 | 8 x $10^1$ | 8 x $10^1$ | 25 | A | 1 |
| | | CS134EBSA30 | 3 x $10^3$ | 3 x $10^3$ | 25 | A | 0,7 |
| | | CS134EBSB20 | 8 x $10^1$ | 8 x $10^1$ | 38 | B | 1 |
| | | CS134EBSB30 | 3 x $10^3$ | 3 x $10^3$ | 38 | B | 0,7 |
| | | CS134EBSC20 | 8 x $10^1$ | 8 x $10^1$ | 50 | C | 1 |
| | | CS134EBSC30 | 3 x $10^3$ | 3 x $10^3$ | 50 | C | 0,7 |
| $^{137}Cs$ + $^{137}Ba^m$<br>*3,02 x $10^1$ years* | 0,511<br>1,173 | CS137EBSA20 | 8 x $10^1$ | 8 x $10^1$ | 25 | A | 1 |
| | | CS137EBSA30 | 3 x $10^3$ | 3 x $10^3$ | 25 | A | 0,7 |
| | | CS137EBSB20 | 8 x $10^1$ | 8 x $10^1$ | 38 | B | 1 |
| | | CS137EBSB30 | 3 x $10^3$ | 3 x $10^3$ | 38 | B | 0,7 |
| | | CS137EBSC20 | 8 x $10^1$ | 8 x $10^1$ | 50 | C | 1 |
| | | CS137EBSC30 | 3 x $10^3$ | 3 x $10^3$ | 50 | C | 0,7 |
| $^{22}Na$<br>*9,50 x $10^2$ days* | 0,545 | NA22EBSA20 | 8 x $10^1$ | 9 x $10^1$ | 25 | A | 1 |
| | | NA22EBSA30 | 3 x $10^3$ | 3 x $10^3$ | 25 | A | 0,7 |
| | | NA22EBSB20 | 8 x $10^1$ | 9 x $10^1$ | 38 | B | 1 |
| | | NA22EBSB30 | 3 x $10^3$ | 3 x $10^3$ | 38 | B | 0,7 |
| | | NA22EBSC20 | 8 x $10^1$ | 9 x $10^1$ | 50 | C | 1 |
| | | NA22EBSC30 | 3 x $10^3$ | 3 x $10^3$ | 50 | C | 0,7 |
| $^{147}Pm$<br>*9,58 x $10^2$ days* | 0,225 | PM147EBSA20 | 8 x $10^1$ | 8 x $10^1$ | 25 | A | 1 |
| | | PM147EBSA30 | 3 x $10^3$ | 3 x $10^3$ | 25 | A | 0,7 |
| | | PM147EBSB20 | 8 x $10^1$ | 8 x $10^1$ | 38 | B | 1 |
| | | PM147EBSB30 | 3 x $10^3$ | 3 x $10^3$ | 38 | B | 0,7 |
| | | PM147EBSC20 | 8 x $10^1$ | 8 x $10^1$ | 50 | C | 1 |
| | | PM147EBSC30 | 3 x $10^3$ | 3 x $10^3$ | 50 | C | 0,7 |
| $^{89}Sr$<br>*5,06 x $10^1$ days* | 1,492 | SR89EBSA20 | 8 x $10^1$ | 8 x $10^1$ | 25 | A | 1 |
| | | SR89EBSA30 | 3 x $10^3$ | 3 x $10^3$ | 25 | A | 0,7 |
| | | SR89EBSB20 | 8 x $10^1$ | 8 x $10^1$ | 38 | B | 1 |
| | | SR89EBSB30 | 3 x $10^3$ | 3 x $10^3$ | 38 | B | 0,7 |
| | | SR89EBSC20 | 8 x $10^1$ | 8 x $10^1$ | 50 | C | 1 |
| | | SR89EBSC30 | 3 x $10^3$ | 3 x $10^3$ | 50 | C | 0,7 |
| $^{90}Sr$ + $^{90}Y$<br>*2,82 x $10^1$ years*<br>*Beta flux given in $^{90}Sr$ + $^{90}Y$ total* | 0,546<br>2,284 | SR90EBSA20 | 8 x $10^1$ | 8 x $10^1$ | 25 | A | 1 |
| | | SR90EBSA30 | 3 x $10^3$ | 3 x $10^3$ | 25 | A | 0,7 |
| | | SR90EBSB20 | 8 x $10^1$ | 8 x $10^1$ | 38 | B | 1 |
| | | SR90EBSB30 | 3 x $10^3$ | 3 x $10^3$ | 38 | B | 0,7 |
| | | SR90EBSC20 | 8 x $10^1$ | 8 x $10^1$ | 50 | C | 1 |
| | | SR90EBSC30 | 3 x $10^3$ | 3 x $10^3$ | 50 | C | 0,7 |
| $^{204}Tl$<br>*1,38 x $10^3$ days* | 0,763 | TL204EBSA20 | 8 x $10^1$ | 8 x $10^1$ | 25 | A | 1 |
| | | TL204EBSA30 | 3 x $10^3$ | 3 x $10^3$ | 25 | A | 0,7 |
| | | TL204EBSB20 | 8 x $10^1$ | 8 x $10^1$ | 38 | B | 1 |
| | | TL204EBSB30 | 3 x $10^3$ | 3 x $10^3$ | 38 | B | 0,7 |
| | | TL204EBSC20 | 8 x $10^1$ | 8 x $10^1$ | 50 | C | 1 |
| | | TL204EBSC30 | 3 x $10^3$ | 3 x $10^3$ | 50 | C | 0,7 |

*(*) Manufacturing tolerance ±30%*

*Equivalent activity: measured flux of emergent particles divided by the emission intensity.*

# Kits of beta sources

| Contents of kit | Product code | β particle flux within 4 π sr (*) for each sources $s^{-1}$ | Holder Diameter for each sources mm | Type | Measurement uncertainty % |
|---|---|---|---|---|---|
| 6 EBSA20 sources | 9CD02EBSA20 | 8 x $10^1$ | 25 | A | 1 |
| 6 EBSA30 sources | 9CD03EBSA30 | 3 x $10^3$ | 25 | A | 0.7 |
| 6 EBSB20 sources | 9CD05EBSB20 | 8 x $10^1$ | 38 | B | 1 |
| 6 EBSB30 sources | 9CD06EBSB30 | 3 x $10^3$ | 38 | B | 0.7 |
| 6 EBSC20 sources | 9CD08EBSC20 | 8 x $10^1$ | 50 | C | 1 |
| 6 EBSC30 sources | 9CD09EBSC30 | 3 x $10^3$ | 50 | C | 0.7 |

**Each kit includes six sources of your choice selected from the ten β emitters shown in the table on p. 2.4.**


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## • Empty Kits

| Product | ∅ (mm) | Type | Reference |
|---|---|---|---|
| Empty kits for ß sources | 25 | A | 9ACETCR |
| Empty kits for ß sources | 38 | B | 9ACETCS |
| Empty kits for ß sources | 50 | C | 000074 |

*(*) Manufacturing tolerance ±30%*